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Low-cost checkpointing and failure recovery in mobile computingsystems

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Abstract
A mobile computing system consists of mobile and stationary nodes, connected to each other by a communication network. The presence of mobile nodes in the system places constraints on the permissible energy consumption and available communication bandwidth. To minimize the lost computation during recovery from node failures, periodic collection of a consistent snapshot of the system (checkpoint) is required. Locating mobile nodes contributes to the checkpointing and recovery costs. Synchronous snapshot collection algorithms, designed for static networks, either force every node in the system to take a new local snapshot, or block the underlying computation during snapshot collection. Hence, they are not suitable for mobile computing systems. If nodes take their local checkpoints independently in an uncoordinated manner, each node may have to store multiple local checkpoints in stable storage. This is not suitable for mobile nodes as they have small memory. This paper presents a synchronous snapshot collection algorithm for mobile systems that neither forces every node to take a local snapshot, nor blocks the underlying computation during snapshot collection. If a node initiates snapshot collection, local snapshots of only those nodes that have directly or transitively affected the initiator since their last snapshots need to be taken. We prove that the global snapshot collection terminates within a finite time of its invocation and the collected global snapshot is consistent. We also propose a minimal rollback/recovery algorithm in which the computation at a node is rolled back only if it depends on operations that have been undone due to the failure of node(s). Both the algorithms have low communication and storage overheads and meet the low energy consumption and low bandwidth constraints of mobile computing systems

Index Terms
Inspec
Controlled Indexing
mobile communication portable computers system recovery

Non-controlled Indexing
communication network communication overheads failure recovery low-cost checkpointing mobile computing systems periodic collection permissible energy consumption recovery costs rollback/recovery algorithm stationary nodes storage overheads synchronous snapshot collection algorithms

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References

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EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
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L2	572	(714/13).ccls.	US-PGPUB; USPAT	OR	ON	2007/05/11 06:29
L3	646	(714/2).ccls.	US-PGPUB; USPAT	OR	ON	2007/05/11 06:30
L4	780	(714/42).ccls.	US-PGPUB; USPAT	OR	ON	2007/05/11 06:30
L5	0	(714/58).ccls.	US-PGPUB; USPAT	OR	ON	2007/05/11 06:30
L6	1039	(714/5).ccls.	US-PGPUB; USPAT	OR	ON	2007/05/11 06:30
L7	476	(714/8).ccls.	US-PGPUB; USPAT	OR	ON	2007/05/11 06:30
L8	2954	(707/200).ccls.	US-PGPUB; USPAT	OR	ON	2007/05/11 06:31
L9	1168	(707/202).ccls.	US-PGPUB; USPAT	OR	ON	2007/05/11 06:31
L10	1937	(707/204).ccls.	US-PGPUB; USPAT	OR	ON	2007/05/11 06:32
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L14	59962	L13	US-PGPUB; USPAT	OR	ON	2007/05/11 06:32
L15	4	previous adj point adj in adj time	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2007/05/11 06:33
L16	4	L15	US-PGPUB; USPAT	OR	ON	2007/05/11 06:33

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L22	0	11 and 13 and 15 and 3	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2007/05/11 06:35
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L24	0	11 and 13 and 17 and 6	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2007/05/11 06:35
L25	0	11 and 13 and 17 and 7	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2007/05/11 06:35

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L30	2	11 and 13 and 17 and ("707"/$).ccls.	US-PGPUB; USPAT; USOCR	OR	ON	2007/05/11 06:36